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Activities of the International Atomic Energy Agency relevant to article IV of the Treaty on the Non-Proliferation of Nuclear Weapons

Background paper prepared by the Secretariat of the International Atomic Energy Agency

Executive summary

The International Atomic Energy Agency (IAEA) has been a global intergovernmental organization for international cooperation in the peaceful uses of nuclear energy since its establishment in 1957 as an independent organization within the United Nations (UN) system. Starting with 68 Member States in 1957, the IAEA's membership had risen to 151 at the time of the 2010 Review Conference for the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and today it stands at 164.

The paper describes the activities of the IAEA, in line with its Statute and the decisions of its policy making organs, which the IAEA has endeavoured to fulfil its functions related to fostering international cooperation in the peaceful uses of nuclear energy since the last NPT Review Conference in 2010.

A wide array of the IAEA's activities is relevant to Article IV of the NPT. These areas of congruence are explained in Section 1 of this paper. The IAEA's major goals and objectives relevant to Article IV of the NPT are highlighted in Section 2.

Through its Technical Cooperation (TC) Programme, which is described in Section 3, the IAEA responds to its Statute's call to make more widely available the benefits of nuclear science and technology for peaceful purposes, with particular emphasis on the needs of developing countries. Currently, 140 Member States/Territories avail the benefits of the IAEA's TC programme.

Nuclear science and technology offer many unique and cost-effective tools in response to rising demand for energy, food, water, health care and industrial output which reflect global demographic and economic trends. As such, related activities of the IAEA carried out through a number of scientific, technical and legal services of the IAEA are outlined in Section 4.

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Conclusions contained in Section 7 note the need for continuing support and commitment to the IAEA's activities relevant to Article IV of the NPT.

1. International cooperation for the peaceful uses of nuclear energy: the International Atomic Energy Agency and the Treaty on the Non-Proliferation of Nuclear Weapons

Article II of the IAEA's Statute stipulates that "[t]he Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world." To fulfil this objective, the IAEA is authorized by Article III.A of its Statute to carry out the following functions:

> "1. To encourage and assist research on, and development and practical application of, atomic energy for peaceful uses throughout the world; and, if requested to do so, to act as an intermediary for the purposes of securing the performance of services or the supplying of materials, equipment, or facilities ...;"
>
> "2. To make provision, in accordance with this Statute, for materials, services, equipment, and facilities to meet the needs of research on, and development and practical application of, atomic energy for peaceful purposes, including the production of electric power, with due consideration for the needs of the underdeveloped areas of the world;"
>
> "3. To foster the exchange of scientific and technical information on peaceful uses of atomic energy;"
>
> "4. To encourage the exchange of training of scientists and experts in the field of peaceful uses of atomic energy."

Article IV of the NPT states:

> "1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty."
>
> "2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also co-operate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world."

The functions of the IAEA predate Article IV of the NPT, in which the rights of all parties to peaceful nuclear cooperation are confirmed, as it contains an obligation of the parties to facilitate the fullest exchange of equipment, materials, scientific and technological information and to co-operate in contributing to the further development of the peaceful uses of nuclear energy.

While the IAEA is not specifically referred to in Article IV of the NPT, it is widely considered to be the principal means of transfer of technology by

international organizations referred to in Article IV.2 of the NPT. The importance of the IAEA's work in the promotion of peaceful uses of nuclear science and technologies has been acknowledged in the final documents of several NPT Review Conferences.

2. International Atomic Energy Agency framework for peaceful nuclear cooperation

2.1. International Atomic Energy Agency strategic goals

Implementation of Article IV of the NPT emphasizes a number of core activities which are also addressed by the Medium Term Strategy (MTS) 2012-2017 of the IAEA. The MTS provides overarching guidance and serves as a roadmap to the IAEA's activities during this period by identifying priorities among and within programmes based on such considerations as recent technological trends, emerging needs and the political, economic and social background. The MTS 2012-2017 also serves as a general framework and guide for the preparation of three programme and budget cycles of the IAEA.

The MTS 2012-2017 says that in order to achieve its strategic objectives, some of them also acknowledged in the final document of the 2010 NPT Review Conference, the IAEA will effectively and efficiently share experience, lessons learned and good practices with Member States, it will promote technology transfer consistent with the IAEA Statute and disseminate good practices from accumulating experience and research so that successes are replicated as quickly as possible and failures are avoided. All of these actions are pursued in a one-house approach manner by the IAEA Secretariat to avoid duplications and take advantage of synergies in the pursuit of the IAEA's thematic strategic objectives.

2.2. Mechanisms for implementation

The IAEA endeavours to meet the goals of the MTS through the provision of a body of scientific, technical, legal, advisory, and support services to its Member States. The services underpin collective efforts for the safe, secure and peaceful promotion of nuclear science and technology. The principal delivery mechanism is the IAEA's Technical Cooperation (TC) Programme. This programme is developed and managed jointly by the Member States and the Secretariat. All parts of the IAEA play their respective roles in the programme. In addition, as part of the IAEA's regular programme of activities, there are other channels for provision of services to Member States.

3. International Atomic Energy Agency Technical Cooperation Programme

3.1. Overview

The IAEA's TC programme is unique in the UN system in that it combines significant technical and developmental competencies for the benefits of Member States. It seeks to forge human and institutional capacities in Member States, so that they can safely and securely maximize the utilization of nuclear technologies to address challenges to sustainable socioeconomic development. As a result, the TC programme contributes to national, regional and international development. The TC programme also contributes to the achievement of the UN Millennium Development Goals, the post 2015 sustainable development agenda, and to the Plan of Implementation of the World Summit on Sustainable Development.

All IAEA Member States are eligible for support, although in practice TC activities tend to largely focus on the needs and priorities of developing countries. The TC programme priorities are established at the national level through the Country Programme Framework (CPF) process, which takes into consideration national development plans, and at the regional level by regional strategic frameworks and profiles and agreed regional priorities. As national and regional priorities change over time, the TC programme is designed to adapt and respond to unforeseen developments and evolving situations.

The goal of the TC programme is to promote tangible socioeconomic impact in areas where the peaceful application of nuclear technology holds a comparative advantage. The programme seeks to promote sustainability and self-reliance. Projects must address an area of real need in which there is a national programme and government commitment. The guiding vision of the programme is that Member States achieve the human and institutional capacities they need in order to address local needs and global issues through the safe utilization of nuclear technologies.

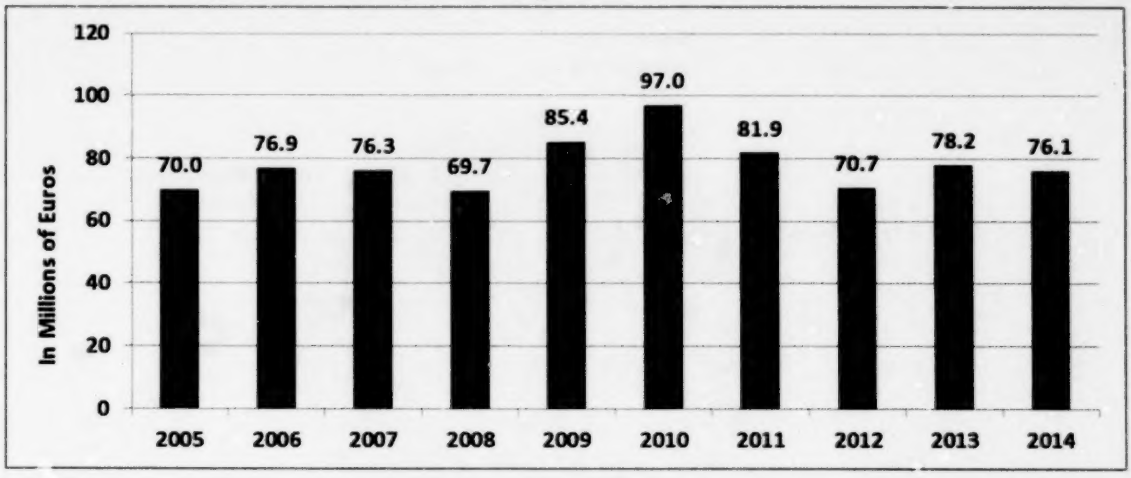
The TC programme is based on more than five decades of dialogue and interaction with Member States and a track record of achievements in the field. It focuses on improving human health, supporting agriculture and rural development, helping water resource management, advancing sustainable energy development, including the option of nuclear power for electricity, addressing environmental challenges, and promoting nuclear safety and security.

The TC programme aims to build partnerships at every level, from local counterparts up to other international organizations, in order to leverage all available support. The IAEA is increasingly involved in UN Development Assistance Framework (UNDAF) development processes. This allows the IAEA to identify areas where joint programming with UN stakeholders can achieve greater socioeconomic impact. The IAEA also engages in Practical Arrangements with relevant UN organizations, and encourages Member States to identify and integrate potential partnerships in the CPFs.

3.2. Resources for the Technical Cooperation Programme

The administrative costs of the TC programme and its in-house technical support are borne by the IAEA's Regular Budget. The cost of TC project components and their delivery is funded by voluntary contributions from Member States. The annual target for contributions to the Technical Cooperation Fund (TCF) is set two years in advance, following consultations among Member States. Since 2005, the TCF target has increased from €55.5 million, to €69 million in 2014. The total resources available to the TC programme during the same period have increased from €70 million to €76.1 million.

Figure 1
Total resources for the Technical Cooperation Programme 2005-2014



3.3. Technical Cooperation Programme in 2014

In 2014, the first year of the 2014-2015 TC programme cycle, 435 new national projects, 96 new regional projects and 6 new interregional projects were initiated, while 146 projects were closed. Active projects total 1475, including 237 projects in closure.

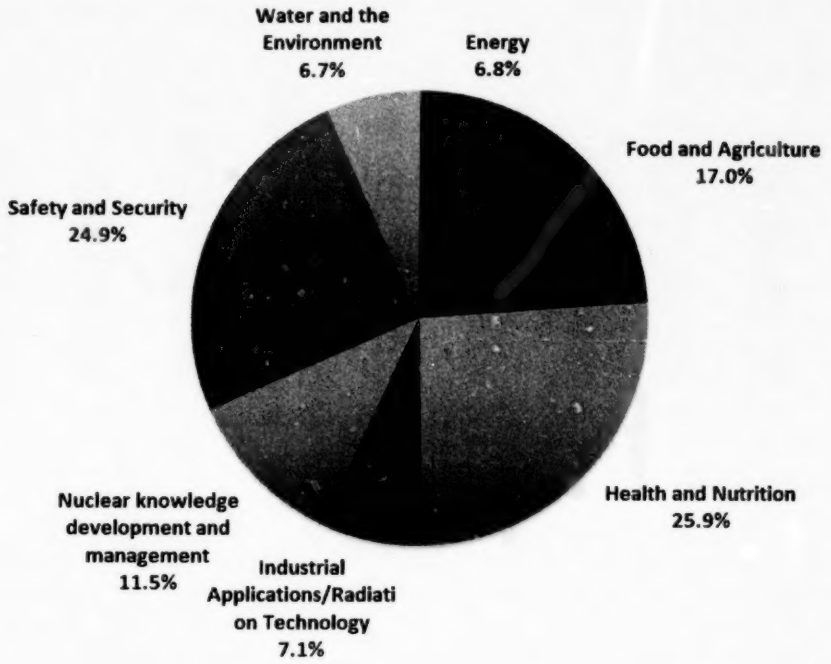
Total TCF resources (including TCF payments for previous years and income) amounted to €64.1 million. However, resources remain insufficient for keeping pace with the requests for support. For example, project components totalling €29.9 million remained unfunded in 2014.

3.4. Recent indicators of programme delivery

The TC programme as a whole disbursed a total of €74 million in 2014 and achieved an implementation rate of 78% for the year 2014. The programme delivered support to 124 countries and territories; 3461 expert and lecturer assignments were carried out, 5285 participants attended meetings, 2830 people took part in 187 training courses and 1677 benefited from fellowships and scientific visits.

The largest single sector of the TC programme in 2014 was health and nutrition, accounting for 25.9% of the programme. The second largest sector was safety and security with 24.9%, followed by food and agriculture at 17%.

Figure 2
Overall disbursements by technical field for 2014


Water and the Environment 6.7%
Energy 6.8%
Food and Agriculture 17.0%
Safety and Security 24.9%
Health and Nutrition 25.9%
Nuclear knowledge development and management 11.5%
Industrial Applications/Radiation Technology 7.1%

3.5. Regional programming and profiles

The differing regional priorities are reflected in the diverging emphases of different regions in their choice of sectors for national and regional projects. For example, health and nutrition accounted for 26.8% in Africa, 34.7% in Europe 25.1% in Latin America and 22.1% in Asia and Pacific. Food and agriculture shows a greater degree of differentiation with 27.3% in Africa, 16.2% in Asia and the Pacific, 17.6% in Latin America, and just 2.7% in Europe.

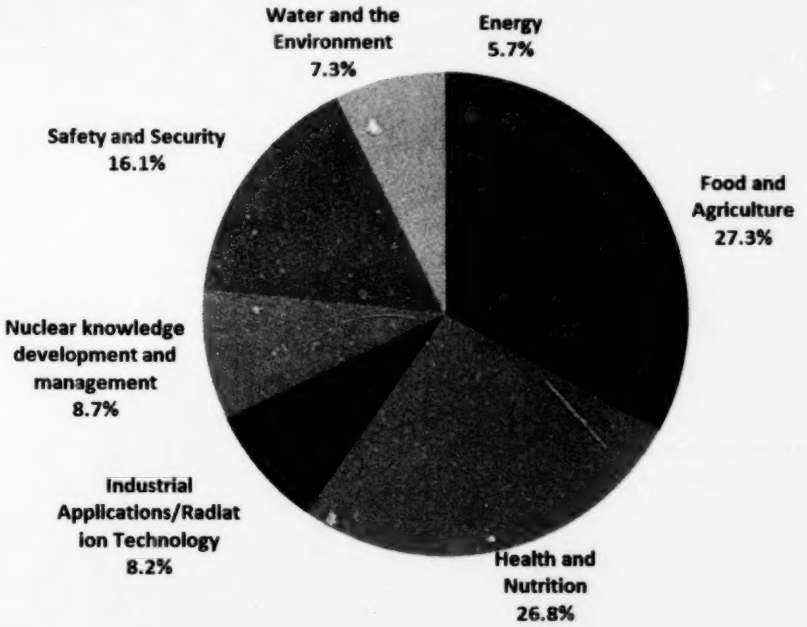
The IAEA develops the TC programme to take into account the support that can be garnered through strategic frameworks for regional cooperative planning in Africa, Asia, Europe, and Latin America and the Caribbean. Regional centres of expertise play an important role in sharing the benefits of nuclear science and technology. Through their participation in regional projects, Member States with more developed nuclear sectors share their knowledge and facilities with other countries in the region with a lesser degree of development.

The 2014-2015 TC programme was formulated with the support of strategic frameworks for regional cooperative planning for Africa, Europe and Latin America and the Caribbean, developed by the Member States themselves. These frameworks, have served as the basis for the regional components of the 2014-2015 programme, and are important planning tools for setting regional cooperation activities.

3.5.1. Africa

Over the last five years the TC programme disbursed €107 million to 40 African States, of which 23 are least developed countries. A total of 4684 participants from Africa attended training courses and there were 3125 fellowship and scientific visitor assignments. As of 31 December 2014, disbursements amounted to €24.9 million.

Figure 3
Disbursements by technical field for 2014 — Africa


Water and the Environment 7.3%
Energy 5.7%
Safety and Security 16.1%
Food and Agriculture 27.3%
Nuclear knowledge development and management 8.7%
Industrial Applications/Radiation Technology 8.2%
Health and Nutrition 26.8%

In Africa, meeting basic human needs remains the focus of the TC programme. Considerable support was provided in the area of food and agriculture, helping Member States to achieve food security. Water availability remains a challenge in the region, and the IAEA has provided several regional and national projects, including a regional project on water resource management for the Sahel region. This project covers five aquifers and river basins which are shared by 15 African countries.

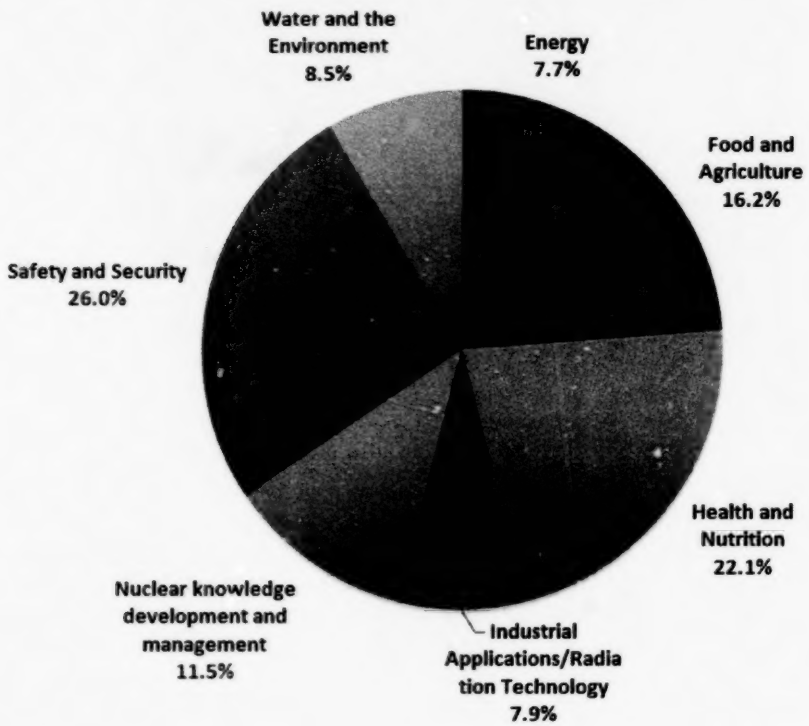
Institutional capacity-building for human health is also a key area for Africa, and here the focus is on developing human resources through education, training and the provision of expert services. With IAEA support, many African Member States have successfully developed institutions and training centres. Within the framework of the African Regional Co-operative Agreement for Research, Development and Training Related to Nuclear Science and Technology (AFRA), 26 Regional Designated Centres (RDCs) in Africa have been established, providing training and expert services for regional development in the fields of human health, food and agriculture, industry, safety and security, energy and environment. The IAEA continues to support the RDCs through the TC programme.

Relevant regional institutions with technical capacity joint the global efforts which were mobilized to respond to the Ebola outbreak and the IAEA has contributed through the provision of emergency assistance; efforts are underway in the establishment of a regional network and warning systems to respond to similar future outbreaks.

3.5.2. Asia and the Pacific

During the last five years, a total of €87.8 million was disbursed through the TC programme to 32 States from the Asia and the Pacific region of which 7 are least developed countries. The IAEA trained 4349 participants from the region and supported 2371 fellowship and scientific visitor assignments. As of 31 December 2014, disbursements amounted to €19.6 million.

Figure 4
Disbursements by technical field for 2014 — Asia and the Pacific


Water and the Environment 8.5%
Energy 7.7%
Food and Agriculture 16.2%
Safety and Security 26.0%
Health and Nutrition 22.1%
Nuclear knowledge development and management 11.5%
Industrial Applications/Radiation Technology 7.9%

In response to the region's growing need for energy and the interest of Member States in the region in nuclear power, the IAEA support in the area of energy is increasing with emphasis on developing Integrated Work Plans (IWPs) in newcomer countries.

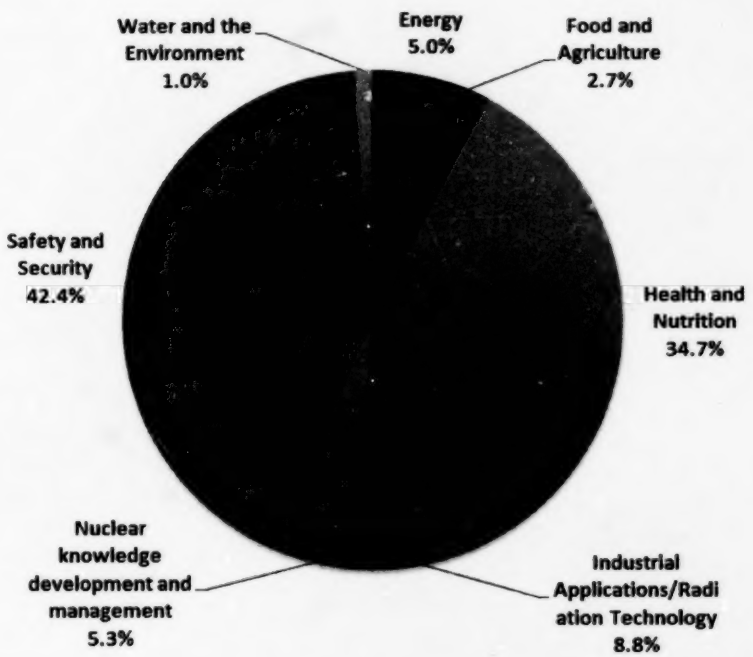
In the area of food security, the IAEA has continued its support in strengthening competencies in soil and water management, crop nutrition and

mutation breeding. Enhancing agricultural productivity and developing suitable crop varieties tolerant to drought and salinity and adaptable to climate change remains a regional priority. Animal production and health assistance has been the focus in building capacities especially the early detection and control of transboundary animal diseases (TADs), including those with zoonotic impact. Specifically, the IAEA is helping Member States in the region to establish national and regional networks that enable early response to, and control of TADs and that facilitate eradication programmes for some zoonotic diseases.

3.5.3. Europe

Over the last five years, the TC programme disbursed a total of €111 million to 29 States from Europe. The IAEA trained 3221 participants from the region, and there were 1483 fellowship and scientific visitor assignments. As of 31 December 2014, disbursements amounted to €11.9 million.

Figure 5
Disbursements by technical field for 2014 — Europe


Water and the Environment 1.0%
Energy 5.0%
Food and Agriculture 2.7%
Safety and Security 42.4%
Health and Nutrition 34.7%
Nuclear knowledge development and management 5.3%
Industrial Applications/Radiation Technology 8.8%

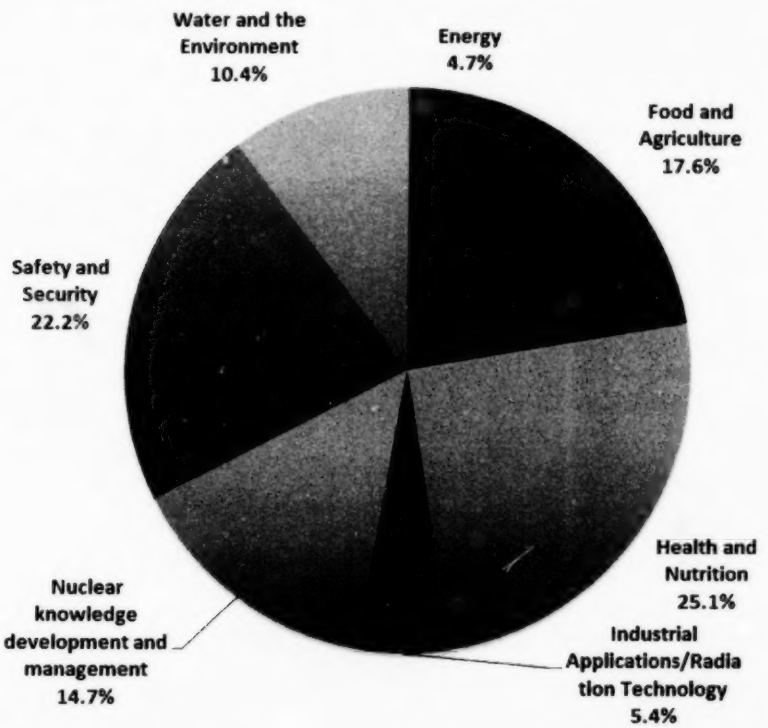
A key priority for Member States in the Europe region is to strengthen nuclear and radiation safety infrastructure in accordance with the IAEA Safety Standards, emphasizing safety of nuclear installations; control of radiation sources; and radioactive waste management and decommissioning. The IAEA has also supported Member States in the Europe region to change the fuel in research reactors from high enriched uranium (HEU) to low enriched uranium (LEU), with the overall aim of reducing proliferation risks.

The European Union (EU) is a key partner. The European Commission has provided extrabudgetary contributions on behalf of the EU to several projects in the region, financed by the former Technical Assistance to the Commonwealth of Independent States (TACIS) programme, and more recently by the Instrument of Pre-Accession Assistance (IPA).

3.5.4. Latin America and the Caribbean

Over the last five years, the TC programme disbursed €65 million to 22 States in the Latin America and Caribbean region. The IAEA trained 2747 participants from the region and there were 1573 fellowship and scientific visitor assignments. As of 31 December 2014, disbursements amounted to €11.9 million.

Figure 6
Disbursements by technical field for 2014 — Latin America


Water and the Environment 10.4%
Energy 4.7%
Food and Agriculture 17.6%
Safety and Security 22.2%
Health and Nutrition 25.1%
Nuclear knowledge development and management 14.7%
Industrial Applications/Radiation Technology 5.4%

Nuclear technologies have been applied to improve efficiency in fertilization, water use, biological nitrogen fixation, crop and livestock improvement, pest and disease control, and for quality control of food products. In the health sector, efforts have been made to improve human resource development, in particular with regards to the efficiency and quality of new techniques for the diagnosis and treatment of diseases, especially cancer, and to ensure the availability of various radiopharmaceuticals required for diagnosis and treatment of cancer and other diseases.

Substantial progress has been made in recent years in the establishment of radiation safety and regulatory infrastructure in the Latin America region, with a focus on the protection of patients, workers, public and the environment. Support has also been provided in the implementation of Long Term Operation programmes in Nuclear Power Plants (NPP) to ensure their safe operation.

3.6. Programme of Action for Cancer Therapy

In 2004, the IAEA established the Programme of Action for Cancer Therapy (PACT) to enable developing countries to introduce, expand or improve their cancer control capacity and services by integrating radiation medicine into a sustainable, comprehensive cancer control programme.

PACT brings together all of the IAEA's cancer-related expertise and services to support the building and strengthening of a global coalition of partners that implement cancer control projects and mobilize funds in a coordinated manner. It has established formal partnerships with several high-profile organizations in the public, private and non-governmental sectors, including inter alia the World Health Organization (WHO), the International Agency for Research on Cancer (IARC) and Union for International Cancer Control (UICC). Working with its partners, PACT builds capacity and long term support for continuous education and training of cancer care professionals, as well as for community based action by civil society to combat cancer. To date, PACT has conducted over 65 comprehensive assessment missions in low and middle income (LMI) Member States. With an increased global focus on non-communicable diseases including cancer, PACT has raised the equivalent of US $32 million in funds and gifts since 2004. To address the cancer workforce shortage in LMI countries, PACT launched in 2010 an e-learning pilot project, the Virtual University for Cancer Control (VUCCnet), to establish a regional education and training network in Africa. This project seeks to support and enhance national programmes to build human resource capacity in cancer control and involves six African countries.

3.7. Challenges facing the Technical Cooperation Programme

The contribution that nuclear science and technology can make to national development is not always well recognized and nuclear development issues are frequently considered separately from mainstream development issues. This can result in limited integration of TC projects in national development plans. The IAEA has addressed this issue by requesting Member States to submit an integrated programme at the national level rather than individual projects, thus leading to a more cohesive and efficient delivery of assistance to Member States. In addition, Member States are advised to establish linkages between nuclear science and technology and their national developmental plans through their CPF, in order to ensure synergies and complementarities with conventional techniques and programmes. Programme priorities are established at the national level through the CPF process, which takes into consideration national development plans, and at the regional level by regional strategic frameworks and profiles and agreed regional priorities.

The IAEA works to raise public awareness of its TC activities and carries out outreach to appropriate partners in the UN system. Closer partnerships and linkages at the national level with other partners from the UN system are an effective means

to leverage the benefits of nuclear technology in addressing development issues. The IAEA is increasingly involved in United Nations Development Assistance Framework (UNDAF) processes. This allows the IAEA to identify areas where joint programming with UN stakeholders can achieve greater socioeconomic impact, and also contributes to raising the awareness of UN system organizations of the development role of the IAEA.

In light of the increasing relevance of nuclear science and technology for development, and the increase in the numbers of Member States and their requirements for TC support, means and mechanisms, it is important to ensure that resources for TC are stable, assured and predictable.

4. Promotion of peaceful nuclear cooperation

4.1. Nuclear energy

The principal peaceful benefit that the founders of the IAEA had in mind when establishing the organisation in 1957, was safe and reliable access to nuclear power. This remains the most prominent peaceful application of nuclear energy and the one with the greatest quantifiable economic benefit. In accordance with priorities of IAEA Member States, the significance of this benefit is reflected in the Medium Term Strategy for 2012-2017, in which the first high-level objective is "Facilitating access to nuclear power".

The number of operational nuclear power reactors in operation worldwide at the end of 2014 was 438, with a total generating capacity of nuclear energy of 375.9 gigawatts-electric (GW(e)). During 2014, five nuclear power reactors were connected to the grid (three in China, one in Argentina and one in Russia). In 2011, construction started on four NPPs. In 2012, there were seven construction starts; ten new constructions commenced in 2013 and, in 2014, there were three construction starts. This results in 70 reactors under construction at the end of 2014, of which 46 were in Asia.[1]

4.1.1. Capacity-building for energy analysis and planning

The IAEA works with its Member States to develop capacity-building on energy system planning and the assessment of the potential contribution that nuclear power could make to a sustainable energy mix. Two studies in this area were completed in 2014 comprising pre-feasibility studies for introducing nuclear power in Jordan and Egypt. Additionally, during 2014, approximately 600 energy analysts and planners from over 50 countries were trained in the use of the IAEA's analytical tools for conducting national and regional studies on future energy strategies and the role of nuclear power.

Enhancement of IAEA's analytical tools for energy system analysis and planning continue to be undertaken and are now being used in research and planning institutions in 130 countries. The models and training provided by the IAEA cover energy demand, supply, environmental impacts, finance, system optimization, and indicators for sustainable development. They are 'technology neutral', i.e. there is no special focus on nuclear power. For some Member States using the models,

[1] As of March 2015, there were 439 nuclear power reactors in operation in the world and 69 under construction.

nuclear power may not currently be an option due to high capital costs, but it is essential that the models still help them identify effective energy strategies.

Each year the IAEA prepares two projections of future nuclear power developments, one 'low' and one 'high'. The projections developed in 2014 expect the global capacity to increase from 374.9 GW(e) at present to 401 GW(e) and to 699 GW(e) by 2030 in the low and high cases respectively. Globally the low scenario projected growth shows a relatively small increase of 8% by 2030 compared to the present day and on a regional basis there is even a projected decline in capacity in some cases. The strongest projected growth of 88% by 2030 is in regions that already have operating NPPs, led by Asian countries.

The IAEA conducts techno-economic analyses and produces publications on the peaceful uses of nuclear energy in climate change mitigation and fostering sustainable development. In 2014, the IAEA published a new edition of the report Climate Change and Nuclear Power, a special issue of a leading journal on the role of nuclear energy in sustainable development, a journal special issue[2] and TECDOC on the comparative assessment of the geological disposal of carbon dioxide and radioactive waste. These include the studies and deliberations of, among others, the Intergovernmental Panel on Climate Change (IPCC), the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) and the Commission on Sustainable Development (CSD). Most recently the 20th session of the Conference of the Parties was held in December 2014 in Lima, Peru where the IAEA had an information booth and participated in a UN Side Event.

4.1.2. Assisting countries considering or introducing nuclear power

At present, over 30 countries are considering a nuclear power programme or are introducing nuclear power into their energy mix.[3] The IAEA supports the Member States interested in exploring options for the use of nuclear power and for implementing nuclear power programmes though development of documents, workshops and training courses, expert missions and review services. A key document entitled "*Milestones in the Development of a National Infrastructure for Nuclear Power*" was revised recently for publication in 2015 to take into account the lessons learned from the Fukushima accident, the development of other IAEA documents such as the IAEA Safety Guide on the nuclear safety infrastructure and feedback from Integrated Nuclear Infrastructure Review (INIR) missions.

In 2012, the United Arab Emirates (UAE) became the first country in 27 years to start the construction of a first NPP, while Belarus and Turkey, which had previously signed contracts, continued their preparation for licensing construction. In 2013, Bangladesh began site preparation work for its two-unit Rooppur NPP and Jordan selected a vendor for its first NPP. Turkey signed two cooperation agreements for its second project, and Viet Nam prepared feasibility studies of two sites for NPPs in Ninh Thuan Province.

In 2014, Belarus began construction of the second unit at the Ostrovets site, becoming the second country in the past three decades to begin construction of its

[2] See International Journal of Global Energy Issues, Vol. 37, 2014.

[3] In 2010, there were approximately 60 Member States that had expressed interest in the introduction of a nuclear power programme.

first NPP. A number of newcomer countries made progress towards the introduction of nuclear power into their energy mix: Turkey approved the Environmental Impact Assessment Report for the Akkuyu Project; Viet Nam approved the Master Plan on nuclear power infrastructure and development; Kenya prepared a pre-Feasibility Study; and Poland approved the national Nuclear Power Programme and issued a contract for an owner's engineer. All those countries have extensively used the services and training activities proposed by the IAEA.

4.1.3. Support for existing nuclear power programmes

Continuously improving the performance, safety and security of NPPs and fuel cycle facilities throughout their life cycles is essential. The IAEA develops and publishes standards and guidelines. On request, expert teams are assembled to conduct peer reviews of facilities to identify potential improvements. Databanks on technologies and operating experience are maintained and training courses are offered for sharing operating experience, new knowledge and best practices.

For the front end of the nuclear fuel cycle, information on uranium resources, exploration, mining and production is assembled and disseminated in order to promote best practices in uranium mining and production to minimize environmental impacts. Regarding the back end of the fuel cycle, inventories of spent fuel are increasing owing to reprocessing capacity constraints. Several Member States are making progress towards the operation of disposal facilities for spent nuclear fuel/high level waste. The IAEA facilitates the development of guidance and exchange of information on methods to increase the capacity of existing facilities and to accommodate extended interim storage durations.

To improve the flow of knowledge and experience among those engaged in waste management and disposal and to encourage organizations in developed Member States to contribute to the activities of Member States requiring decommissioning and waste management assistance, the IAEA has established a number of networks.

4.1.4. Innovation

The IAEA's International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO), which was launched in 2000, is continuing to grow and now comprises 41 participants (Member States and the European Commission) with the addition of Bangladesh and Thailand as the latest members. The IAEA provides INPRO services to Member States that help build their capacity to perform detailed nuclear energy system (NES) sustainability assessments. These INPRO services consider all aspects that are essential to sustainable implementation of nuclear power, including an introduction to Safeguards by design (SBD) principles and good practices in non-proliferation. INPRO also conducts, in partnership with Member States, specific collaborative studies of institutional and technical innovations that support long term NES sustainability and international collaboration.

The IAEA promotes and favours the use of innovative reactor technologies not only for the historical role as producers of electricity, but also for non-electrical process heat applications (e.g. seawater desalination, hydrogen production, district heating, tertiary oil recovery, etc.) which have significant potential in future, ensuring worldwide energy and water security, supporting sustainable development.

Another important area is represented by the support to the Member States in the field of verification and validation of advanced models and simulation tools to be used for the design and safety analysis of innovative nuclear energy systems.

4.1.5. Research reactors

Member States continue to be supported in various aspects related to building, maintenance and utilization of research reactors through networks/coalitions, outreach activities, training workshops and publication of guidance documents. This includes assistance related to research reactor ageing, modernization and refurbishment. The IAEA continues to support the minimization of the civilian use of HEU through the conversion of HEU fuel to LEU and the repatriation of HEU to country of origin. By the end of 2014, 92 research reactors had been converted to LEU fuel or confirmed as shut down, including one molybdenum-99 production facility that used HEU. Since 2010, 305 kg of fresh HEU from seven countries, and 753 kg of spent HEU from nine countries has been removed and shipped back to the country of fuel origin under the auspices of the Russian Research Reactor Fuel Return (RRRFR) Programme. By the end of 2014, liquid HEU fuel was discharged from the FOTON research reactor in Uzbekistan and the implementation of the site decommissioning was launched. An agreement was finalized to support the conversion of HEU fuel to LEU in the Chinese-origin miniature neutron source reactor (MNSR) in Ghana, and the IAEA initiated efforts to provide assistance in the removal and transportation of the irradiated HEU core from Ghana to China. A meeting on MNSR Conversions from HEU to LEU fuel was held in December 2014 in which representatives from each country hosting an MNSR, as well as stakeholders supporting both the conversion and HEU removal activities, participated.

4.2. Nuclear applications

Nuclear science and technology offer many unique and cost effective tools, and have the potential for positive socioeconomic impact in responding to development challenges in key areas such as food and agriculture, human health and industries as well as water resource and environmental management. This has led to increased demands for science and technology based capacity-building assistance from Member States that do not have a nuclear power programme.

The IAEA has its own scientific laboratories located in Austria and Monaco. They play a fundamental role in supporting the aforementioned activities by providing the necessary scientific and technical expertise, equipment and resources.

4.2.1. Human health

The focus of the IAEA's Human Health programme is on enhancing capabilities for the prevention, diagnosis and treatment of health problems through the safe and effective application of nuclear techniques. From 2010 to 2015, the programme accounts for more than 22% of all TC projects. Since 2010, the Human Health programme has supported approximately 235 training courses covering all areas of its work that have been attended by more than 3800 trainees.

The rising prevalence in recent years of chronic and non-communicable diseases (NCDs) has led to an equally rapid rise in demand for technical assistance in the use of radiation medicine technologies to combat them. In an effort to

contribute to actions that reduce the burden of NCDs, the IAEA has joined the UN Interagency Task Force on the Prevention and Control of NCDs.

Recent years have witnessed remarkable developments in the field of radiation medicine; new diagnostic and treatment procedures have been broadly adopted by medical facilities around the world. While IAEA Member States have made noteworthy investments in radiation oncology, nuclear medicine and radiology, gaps in expertise remain, especially in low- and middle-income countries. In order to answer to those needs the IAEA has made relentless efforts in developing professional competences. The capacity-building efforts of radiation medicine have been focused in strengthening the abilities of the multidisciplinary teams of professionals involved in the practice of these specialties.

Today nearly every country in the world experiences a level of malnutrition that constitutes a serious public health risk. Between two and three billion people are malnourished, or are overweight or obese, or have some sort of micronutrient deficiency. The IAEA's work in nutrition focuses on improving infant and child nutrition to achieve long-term health and development benefits, based on evidence linking early life malnutrition to an increased risk of adult chronic NCDs, including cardiovascular disease, diabetes, and cancer.

The use of information and communication technologies has expanded the reach of the IAEA's education and training activities. Educational initiatives such as the Human Health Campus website provide teaching materials for self-directed learning for continuous professional development. Since its launch in 2010, over 716 000 pages have been viewed by users from over 170 countries.

The challenge of day to day management of cancer becomes even greater when doctors are unable to discuss difficult cases or confer with their colleagues. AFROnet is a telemedicine, a web-based platform that allows physicians from Canada, the United States and various African States to present challenging patients and share diagnostic information, such as CT scans and X-rays, as well as actual treatment plans for the patients with the goals of finding the best way to treat the patient. This service can be used on mobile phones as well, bridging the geographical gap and preventing the isolation of practitioners in small centres-especially those with a single radiation oncologist.

The IAEA dosimetry laboratory at its facilities in Seibersdorf, Austria, provides calibration and dosimetry verification services for radiotherapy machines that are used to treat cancer. Between 650 and 700 radiation beams are audited each year to ensure appropriate calibration of equipment and delivery of correct radiation doses in Member States, many of which have no other access to such services.

4.2.2. Food and agriculture

The IAEA and the Food and Agriculture Organization of the United Nations (FAO) have been working together to ensure food security for fifty years through the Joint FAO/IAEA Programme on Nuclear Techniques in Food and Agriculture. This programme assists in the safe and appropriate use of nuclear techniques and related biotechnologies to increase and sustain food and agricultural production as well as food safety. The Joint Division also provides support to emergency preparedness and response to nuclear and radiological incidents affecting food and agriculture, including agricultural countermeasures.

There has also been a substantial increase in the use of radiation as a replacement for chemical and other methods to treat foodstuffs for safety and phytosanitary purposes, which also generates access to export markets as well as employment.

The FAO/IAEA Agriculture and Biotechnology Laboratory (ABL), in Seibersdorf, provides scientific and technical support in the conception, adaptation and improvement of nuclear and related techniques and technologies, and strengthens capacity in the use of these applications through international cooperation in research and training. The laboratory also provides guidance on the introduction of analytical quality control and quality assurance measures in Member State laboratories, and training in the maintenance of equipment and instruments. During the past five years, services have been proved to 111 Member States and more than 750 trainees were trained at the Seibersdorf complex.

4.2.3. Water resources

Securing access to safe water for drinking water, as well as adequate freshwater supply for sanitation, food production and energy generation is an issue of increasing importance. Reliable hydrological information is required for the adoption of sound policies to successfully cope with climate change and reduced availability of water. Surface and ground waters are powerful tools for tracing processes in the water cycle, including the origin and pathways of rainfall and snowmelt to, and hydraulic interactions between, aquifers, lakes and rivers. Naturally occurring, stable and radioactive isotopes present precipitation. Isotope "fingerprints" in water help to cost-effectively assess and manage water resources.

The IAEA assists Member States in conducting water resources assessment projects using isotope and geochemical tools through the IAEA's TC and coordinated research projects (CRPs) in more than 65 countries. Numerous water professionals and technicians are trained each year in the use of advanced hydrological and geochemical methods, field sampling protocols, isotope data interpretation as well as laboratory analytical procedures. The IAEA has an Isotope Hydrology Laboratory in Vienna. The laboratory develops and improves analytical and sampling methods for the application of nuclear techniques and provides training and technical support to other laboratories in Member States to gain self-reliance in isotope analysis as well as in providing access to advanced analytical techniques.

4.2.4. Environment

To promote timely and informed environmental management and protection, the IAEA provides assistance in developing a greater understanding of, and better analytical capacities regarding key phenomena in marine and terrestrial environments. These phenomena include the movement and fate of various pollutants in the environment, with a particular focus on natural habitats, coastal zones and effects on marine organisms; the impacts of climate change and rising atmospheric concentrations of carbon on marine ecosystems and resources; and the movement, fate and environmental effects of pollutants released into the atmosphere by industrial and mining activities. The IAEA conducts these activities at its environmental laboratories in Monaco and Seibersdorf. The establishment, strengthening and coordination of worldwide networks of environmental

laboratories to address these issues are important areas of work. For example, the Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA) network, which monitors environmental radioactivity worldwide, has expanded from 40 Member State laboratories in 2006 to 149 at the end of 2014.

The IAEA's Environment laboratories play a crucial role in assuring the quality of radionuclide, trace element and organic contaminant analyses through the coordination of intercomparison tests with laboratories around the world. They also develop, maintain and distribute international reference materials that serve as global benchmarks for the accurate analysis of radionuclides, trace elements, organic contaminants and stable isotopes in environmental samples.

4.2.5. Radioisotope production and radiation technologies

The IAEA supports the production of radioisotopes and related products for health care and industry, and for industrial applications of radiation technologies. Assistance in building the necessary scientific and technical capacities and infrastructure improves the availability of important radiopharmaceuticals that are essential in the diagnosis and treatment of diseases such as cancer. The IAEA also provides assistance in the use of radiation and radioisotopes to increase the safety, quality and environmental friendliness of industrial processes and products.

Since 2010, new production methods for diagnostic medical radioisotopes such as Molybdenum-99 and Germanium-68 have been explored.

Through a CRP, the IAEA has brought together international experts to explore the use of radiation technology to both treat waste and as a tool to produce novel bio-friendly materials.

Support was given to Member States in the application of radiography as a non-destructive testing tool. Since 2010, more than 200 TC projects have been implemented involving more than 300 fellowships and scientific visits. Over 100 participants in radiation processing technology and operations have also been trained. Coordinated research activities during this period involved teams from over 150 institutions, resulting in new technical methodologies and products for use in health care and industry, as well as R&D capacity-building in the participating teams.

4.2.6. Nuclear sciences

The IAEA provides nuclear data services which underpin nuclear energy as well as non-energy applications. An Isotope Browser App for mobile phones, recently developed is now available to researchers to make this important data more accessible.

Support is also provided in capacity-building in the area of accelerator applications to enable Member States to use these applications for a variety of analyses such as materials testing or in basic research and development.

The IAEA's Nuclear Sciences and Instrumentation Laboratory in Seibersdorf provides training facilities for Member States in the areas of accelerator applications and nuclear instrumentation. Since 2010, nearly 100 participants have been trained at the labs in nuclear instrumentation and support is extended to over 100 TC projects in the areas of accelerator applications and nuclear instrumentation.

4.2.7. Renovation of the Nuclear Applications Laboratories

Eight of the IAEA laboratories are located in Seibersdorf, Austria and support activities in food and agriculture, human health, the environment, and nuclear science. These laboratories serve all of the IAEA's Member States, with 151 of 164 Member States receiving support from these laboratories during the 2012-2013 biennium. Member State demands for assistance from the laboratories have been rising steadily in recent years, while new challenges such as climate change and the global cancer epidemic have emerged that require new techniques and technologies.

Since their establishment in 1962, however, the Nuclear Applications Laboratories in Seibersdorf have not received any comprehensive renovation or upgrading of equipment, and as a consequence they are increasingly struggling to meet the growing and evolving demands of Member States. For this reason, the IAEA has launched a project entitled the Renovation of the Nuclear Applications Laboratories (ReNuAL).The project formally commenced on 1 January 2014 with a target budget of €31 million to be reached through a mixture of IAEA regular budget and Member State extrabudgetary funds. The project plan consists of new building construction, the renovation of existing buildings, the acquisition of new laboratory equipment to replace aging or obsolete instruments, and infrastructure upgrades. The project is scheduled for completion in December 2017.

4.3. Nuclear safety

Maintaining a high level of nuclear safety is crucial in using nuclear technology to meet the essential needs of Member States. Ensuring safety is primarily the responsibility of each State. However, the recognition of far reaching and transboundary consequences of any severe nuclear or radiological emergency has led to the recognition of the central role of the IAEA in promoting international cooperation and in coordinating international efforts to strengthen global nuclear safety, in providing expertise and advice in this field and in promoting nuclear safety culture worldwide.

4.3.1. The accident at the Fukushima Daiichi nuclear power plant

Following the accident at the Fukushima Daiichi NPP (the Fukushima Daiichi accident), an IAEA Action Plan on Nuclear Safety (the Action Plan) was unanimously endorsed by Member States at the 55th regular session of the IAEA's General Conference in September 2011. The Action Plan defines a programme of work to strengthen the global nuclear safety framework and covers 12 overarching areas.

Significant progress has been made in several key areas under the Action Plan, such as assessments of safety vulnerabilities of NPPs, strengthening of the IAEA's peer review services, improvements in EPR capabilities, strengthening and maintaining capacity-building, and protecting people and the environment from ionizing radiation. The IAEA continued to share and disseminate the lessons learned from the Fukushima Daiichi accident through the analysis of relevant technical aspects. The IAEA organized eight international experts' meetings on relevant topics. Successful implementation has required the full cooperation and commitment of Member States, the Secretariat and other relevant stakeholders.

Significant progress has been made with the preparation of the IAEA Report on the Fukushima Daiichi Accident, which will be published in 2015. This report is intended to serve as a key technical reference document on the accident for years to come. Five working groups composed of approximately 180 internationally recognized experts from 42 Member States and several international bodies have been working on the preparation of five technical volumes of the report. A summary report is also being prepared.

4.3.2. Safety standards

By its Statute, the IAEA is authorized to establish safety standards and provide for their application. A complete set of 14 Safety Requirements was published and updated by the IAEA in order to achieve the Fundamental Safety Principles issued in 2006. They are supported by a number of Safety Guides, providing recommendations on how to comply with the requirements.

In 2011, after the Fukushima Daiichi accident, a process was initiated for a systematic review and, as necessary, revision of the safety standards. The review has confirmed the adequacy of the current Safety Requirements, revealed no significant areas of weakness; a small set of amendments were proposed to strengthen the requirements and facilitate their implementation. The process of developing and updating subsequent Safety Standards and Safety Guides continues. From 2010 to 2014, more than 40 standards were published.

4.3.3. Emergency preparedness and response

The IAEA's emergency preparedness and response (EPR) capability is based on the Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, its Statute, the IAEA Safety Standards, decisions of policy-making organs, inter-agency agreements, and best international practice.

Following the Fukushima Daiichi accident, through the IAEA Action Plan on Nuclear Safety, the role of the IAEA has been extended to cover the assessment of potential emergency consequences and prognosis of possible emergency progression. The IAEA fulfils its response and preparedness roles through the IAEA's Incident and Emergency System and the Incident and Emergency Centre as the IAEA's focal point for EPR.

Since 2010, to assist Member States in strengthening their EPR arrangements, the IAEA published 10 publications covering lessons learned from past emergencies, generic procedures for response to emergencies at research reactors, EPR for countries embarking on a nuclear power, public communications and biodosimetry in EPR, public protective actions in case of reactor emergencies and use of the International Nuclear and Radiological Event Scale (INES). It also finalized the revision of Safety Requirements for "Preparedness and Response for a Nuclear or Radiological Emergency".

The States Parties to the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency register their national assistance capabilities in the IAEA Response and Assistance Network (RANET), which was launched in 2006. Up to now 27 States Parties to the Convention (out of 112) registered their assistance capabilities in RANET.

The IAEA also provides the secretariat for the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE) comprised of 18 intergovernmental organizations and serves as inter-agency mechanism to ensure coordinated and harmonized international response to nuclear or radiological emergencies. The Committee is maintaining the Joint Radiation Emergency Management Plan of the International Organizations (JPLAN).

4.3.4. Safety of nuclear installations and peer review missions

The implementation of the Integrated Regulatory Review Service (IRRS), which commenced in 2006, is progressing. From 2006 to 2014, the IAEA conducted 60 missions in 44 countries. The issuance of the IRRS Guidelines in May 2013 and of the Self-Assessment of Regulatory Infrastructure for Safety (SARIS) Guidelines, further contributed to the effectiveness and efficiency of the programme. Since June 2011, the IRRS reviews have addressed the regulatory implications of the Fukushima Daiichi accident in an additional module.

Assistance is also provided to enhance self-assessment capabilities, to improve the exchange of information on operating experience and to address general operational safety aspects through a range of services, including the incident reporting systems for nuclear power plants, research reactors and fuel cycle facilities. The International Decommissioning Network provides a forum for sharing of practical decommissioning experience. The Design and Safety Assessment Review Service (DSARS) has been developed to enhance safety assessment capabilities and the Site and External Events Design (SEED) service for NPPs has been developed to enhance NPP site selection and characterization.

From 2010 to 2014, the IAEA's Operational Safety Review Team (OSART) missions visited 27 NPPs in 17 countries. The IAEA has also recently started conducting OSARTs of corporate organisations, as these can influence activities and behaviours at NPPs.

From 2010-2014, 19 INSARR and safety review missions and more than 30 safety expert missions have been conducted at research reactor facilities. Assistance was also provided to address the implications of the Fukushima-Daiichi accident on research reactors.

4.3.5. Radiation and transport safety

Every year, radioactive sources that are not under regulatory control ('orphan' sources) are discovered at ports of entry and metal recycling facilities around the world. Many Member States do not have sufficient expertise or resources to characterize such radioactive material or to re-establish regulatory control over orphaned sources. This challenge is addressed by promoting the wider application of the Code of Conduct on the Safety and Security of Radioactive Sources. Agreement to use the Code has continued to grow (123 States as of December 2014) and the IAEA has continued to assist Member States in its implementation. The IAEA offers assistance in the form of review or advisory missions to help States establish/strengthen their regulatory infrastructure to improve control of radiation sources. In addition, the IAEA provides States with the Regulatory Authority Information System (RAIS).

One important issue in transport is denial or delay of shipment of radioactive substances, such as radioisotopes used in nuclear medicine, industry and research. Due to the short half-life (in the order of hours or days), these expensive and often scarce radioisotopes lose their usefulness every hour they are delayed. The IAEA has worked with transport companies to sensitize them to measures that are taken to strengthen the safe handling and transport of radioactive material. Periodically, the IAEA has also facilitated informal discussions between coastal and shipping States with a view to maintaining dialogue and consultation aimed at improving mutual understanding, confidence building and communication in relation to the suitable and safe maritime transport of radioactive material. This has led to the practice of some shipping States and operators of providing timely information and responses to relevant coastal States in advance of shipments in order to address concerns regarding nuclear safety and security, including emergency preparedness, noting that the information and responses provided should in no case be contradictory to measures of nuclear security and safety of the shipment or of the Shipping State.

The IAEA is working with States on a regional basis to increase the State regulatory oversight capacity for the transport of radioactive material. By developing national and regional action plans and training and information provided by the IAEA, through transport regional projects in Africa, Asia Pacific, Latin America and the Mediterranean Region the IAEA encourages the States involved to collaborate to harmonise and increase their regulatory oversight capacities.

4.3.6. International safety conventions

All States operating land based NPPs, except one, are amongst the 77 Contracting Parties to the Convention on Nuclear Safety (CNS), which aims at achieving and maintaining a high level of safety. At the last review meeting held in March/April 2014, Switzerland submitted a formal proposal to amend Article 18 of the CNS (Design and Construction). The Contracting Parties decided by a two-thirds majority to submit the proposal to a Diplomatic Conference. The Conference met at the IAEA's Headquarters of the IAEA, Vienna, Austria, on 9 February 2015 and was attended by 71 Contracting Parties. The Conference adopted by consensus the "Vienna Declaration on Nuclear Safety", which includes principles for the implementation of the objective of the Convention to prevent accidents and mitigate radiological consequences.

The Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management aims to achieve and maintain a high level of safety worldwide in spent fuel and radioactive waste management resulting from civilian nuclear activities. The fourth review meeting of the Contracting Parties was held in May 2012 with the participation of 54 Contracting Parties. The review meeting noted that, although significant progress had been made since the last review meeting, challenges remained, including ensuring the robustness of the review process itself, the availability of spent fuel storage capacity and the delivery of disposal solutions. By the end of 2014, there were 69 contracting parties to the Joint Convention.

4.4. Nuclear security

Ensuring security is primarily the responsibility of each State. The IAEA has supported upon request, the efforts of States to improve and sustain nuclear security

whenever nuclear or other radioactive material is in use, storage and/or transport. This assistance has taken the form of capacity-building, publication of guidance documents, human resource development, peer reviews and advisory services, sustainability and risk reduction. The IAEA's central role in strengthening the global nuclear security framework has been recognised in the IAEA General Conference resolutions and in other events such as at the 2013 *International Conference on Nuclear Security: Enhancing Global Efforts*, organised by the IAEA at which a Ministerial Declaration was adopted. The IAEA will organize the next international conference at ministerial level in Vienna on 5-9 December 2016.

4.4.1. Nuclear Security Plan

The IAEA has been providing, upon request, assistance to States to support their national efforts to establish and continuously improve nuclear security since the early 1970s when it began providing ad hoc training in physical protection. The IAEA's first comprehensive plan of action to protect against nuclear terrorism, the Nuclear Security Plan (NSP), was approved in 2002 along with the creation of a voluntary funding mechanism, the Nuclear Security Fund, in order to help implement the Plan. Subsequent plans were adopted in 2005, 2009 and 2013. The current plan covers the period 2014-2017. Details of assistance provided under the various NSP are set out in the IAEA's annual Nuclear Security Reports, Annual Reports and in the latest report on the Implementation of the IAEA Nuclear Security Plan 2010-2013.

4.4.2. Physical protection

At the 2010 NPT Review Conference, the important role of IAEA in fostering international cooperation in nuclear security in establishing a comprehensive set of nuclear security guidelines, and in assisting Member States, upon request, in their efforts to enhance nuclear security was emphasized.

In 2005, the States Parties to the Convention on the Physical Protection of Nuclear Material (CPPNM) agreed an Amendment to the CPPNM which, upon its entry into force, will extend the physical protection measures of the CPPNM to nuclear facilities and material in peaceful domestic use, storage and transport. While the Amendment to the CPPNM has received strong political support and the number of the States Party which formally accepted the Amendment increased from 33 (as of December 2009) to 83 (as of December 2014), yet 17 more States Party to the CPPNM have to accept the Amendment for it to enter into force.

During 2010-2014, the IAEA conducted a total of 44 International Physical Protection Advisory Services (IPPAS) and International Nuclear Security Advisory Service (INSServ) missions, and a number of shorter technical visits. The IAEA has also developed a Nuclear Security Information Management System (NUSIMS).

Through its Incident and Trafficking Database (ITDB) programme, the IAEA collects information on incidents of illicit trafficking and other unauthorized activities and events involving nuclear and other radioactive material. The scope of the ITDB covers any acts or events that involve any type of nuclear or radioactive material outside legitimate control and protection. The database tracks events that occurred intentionally or unintentionally, including unsuccessful or thwarted acts. Between 2010 and 2014, 19 States joined the ITDB programme, bringing the total number of participating States to 128.

From 1 January 2010 to 31 December 2014, 847 incidents were reported to the ITDB; 769 of these were reported to have occurred during this period and the remaining 178 were reports of prior incidents. Seventy-one incidents reported to have occurred between 2010 and 2014 involved illegal possession and related criminal activities, including attempts to sell or smuggle nuclear material or radioactive sources.

4.4.3. Other activities

Acting in the framework of the NSP and at the request of States, the IAEA has undertaken the following activities in 2010-2014:

- Published new and revised recommendations and guidelines in the IAEA's Nuclear Security Series of publications, for use by States in the establishment of their national nuclear security systems.[4] In 2010-2014, the IAEA issued 10 new publications bringing the total published to date to 22.[5]
- Developed an educational programme in nuclear security (published in 2010) which outlines a comprehensive Master of Science curriculum in nuclear security. The pilot project using the syllabus was completed in 2014.
- Provided training to nearly 400 international, regional and national training courses and workshops involving over 6200 participants.
- Published six e-learning modules covering technical aspects of nuclear security.
- Supplied some 1400 detection and border monitoring instruments to 20 States.
- Completed, or was in the process of completing, physical protection upgrades in a number of States.
- Developed long term national work plans that consolidate an individual State's range of nuclear security needs and the steps required to meet them in an Integrated Nuclear Security Support Plan (INSSP). As of December 2014, some 100 INSSPs had been approved, finalised or drafted.
- As part of its support for security measures at major public events, the IAEA assisted Belarus, Brazil, Cambodia, Colombia, Gabon, India, Malaysia, Mexico, Poland, South Africa, Sri Lanka, Ukraine, Zambia and Zimbabwe in their preparations to host major public events.

The IAEA's nuclear security activities are funded by its regular budget and by voluntary contributions, but mostly by the latter. Over the last five years, contributions made or pledged to the Nuclear Security Fund totalled more than €100 million.

[4] In 2012, the Nuclear Security Guidance Committee (NSGC) was established open to all member States, to make recommendations on the development and review of these publications.

[5] The publications included the lead publication in the Nuclear Security Series, Objective and Essential Elements of a State's Nuclear Security Regime (IAEA Nuclear Security Series No. 20), which was endorsed by the Board of Governors in September 2012, and Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5).

4.5. Nuclear law

The global framework for nuclear law is expanding rapidly. Over the past decades, States have adopted more than a dozen international legal instruments in the fields of nuclear safety, security, safeguards and liability for nuclear damage. Recognizing that comprehensive national legal frameworks are essential for ensuring the safe and peaceful uses of nuclear energy, the IAEA assists States, upon request, in developing nuclear legislation, in all areas of nuclear law, in particular, nuclear safety, security, safeguards and nuclear liability. This assistance is provided through international, regional and national workshops and seminars, missions to create awareness of the international nuclear legal instruments, bilateral assistance in drafting national laws, training of individuals and the development of reference material, in particular, the two volumes of the IAEA Handbook on Nuclear Law.

From 2010 to 2014, more than thirty international, regional and national workshops were organized. Further, since 2010, country specific bilateral legislative assistance has been provided to more than seventy Member States.

At the request of Member States, individual training has also been provided since 2010 to more than three hundred legal experts through short term visits to IAEA Headquarters, as well as at the annual two-week IAEA Nuclear Law Institute.

5. International Atomic Energy Agency Peaceful Uses Initiative

The IAEA Peaceful Uses Initiative (PUI), launched in 2010, has become instrumental in raising extrabudgetary contributions which supplement Technical Cooperation Fund to support Technical Cooperation footnote/a projects and other unfunded projects of the IAEA in the areas of peaceful application of nuclear technology. Additional resources made available through the PUI have served to enhance the IAEA's ability to fulfil its priorities and statutory responsibilities and to meet the needs of Member States. Extrabudgetary contributions made through the PUI have been used to support a wide variety of IAEA activities aimed at promoting broad development goals in Member States, such as in the areas of food security, water resource management, human health, nuclear power infrastructure development and nuclear safety, many of which would have remained unfunded otherwise. PUI has also allowed the IAEA to be more flexible and quick in responding to shifting priorities of Member States as well as to unexpected needs or unforeseen emergency events as demonstrated in the aftermath of the Fukushima accident as well as the Ebola virus disease outbreak in western African States. To date, PUI has helped raise over 60 million Euros in financial contribution from 13 Member States and the European Commission, in support of more than 170 projects that benefit more than 130 Member States.

6. Assurances of supply of nuclear fuel

The establishment of an IAEA owned and operated Low Enriched Uranium (LEU) Bank was approved by the Board of Governors on 3 December 2010. Kazakhstan offered to host the IAEA LEU Bank. The IAEA Secretariat is well advanced in its work on the financial, legal and technical arrangements for establishing the bank. In 2014, a programmatic impact of seismic safety on the overall IAEA LEU Bank project was assessed to determine whether a geological fault that exists in close proximity to the proposed IAEA LEU Bank site has the potential to affect the safety of the IAEA LEU Bank. In early 2015, agreement was

reached between the IAEA and Kazakhstan on an ad referendum basis on the text of a Host State Agreement (HSA) for the IAEA LEU Bank, and separately with the Russian Federation, also on an ad referendum basis, on a draft Transit Agreement for the IAEA LEU Bank. Subject to final approval of the relevant parties, the two agreements will be submitted to the June 2015 Board of Governors for approval. In the meantime, the IAEA and Kazakhstan are working to complete several technical agreements subsidiary to the HSA needed for the IAEA LEU Bank.

The LEU Reserve under the IAEA's auspices was inaugurated on 17 December 2010, located at the International Uranium Enrichment Centre in Angarsk, Russian Federation.

On 10 March 2011, the IAEA Board of Governors approved a proposal for a Nuclear Fuel Assurance (NFA) by the UK, co-sponsored by the Member States of the EU, the Russian Federation and the USA, for the *Assurance of Supply of Enrichment Services and Low Enriched Uranium for Use in Nuclear Power Plants*.

7. Conclusions

Since the last NPT Review Conference in 2010, the IAEA has continued its efforts to respond to the evolving requirements of its Member States. The range of IAEA activities related to Article IV of the NPT is diverse. The IAEA plays unique role in making nuclear science and technology available to improve the lives of people everywhere.

The IAEA's roles, responsibilities and services have grown in response to the issues, challenges and opportunities facing its Member States and the international community. Its programme of work has increased in response to demands and expectations, as have its efforts to critically assess and optimize its services for reasons of effectiveness, and efficiency. As the IAEA looks to the future and responds to the demands and expectations of its Member States, it can expect to see increasing requests for support to the introduction of nuclear power, a greater focus on human health, food safety and security and sustainable management of natural resources.

To extend the reach of its activities and multiply their benefits, the requirement for agreements and working relationships with partner organizations in and outside the UN system is likely to grow.

In light of the expanding use of nuclear power and other nuclear applications for meeting basic human needs, expectations that all such nuclear activities should be carried out in the safest and most secure manner will continue. For the IAEA to fulfil these expectations, it will require the strong commitment and continued support of its Member States.